#7/11 T. Bell 12-14-01

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Yasuyoshi YAMADA

Appln. No.: 09/435,448

Confirmation No.: Not Yet Assigned Group Art Unit: 2814

Filed: November 22, 1999 Examiner: D. Graybill

For: BACK ELECTRODE TYPE ELECTRONIC PART AND ELECTRONIC ASSEMBLY WITH THE SAME MOUNTED ON PRINTED CIRCUIT BOARD

AMENDMENT UNDER 37 C.F.R. § 1.111

Commissioner for Patents
Washington, D.C. 20231

Sir:

In response to the Office Action dated September 12, 2001, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Please amend the specification as follows:

Please replace the last paragraph on page 8 which bridges over to page 9 with the following:

A1 Fig. 5 is a cross sectional view along the line I-I of Fig. 4 when the BGA type electronic part of Fig. 2 is mounted on the printed circuit board of Fig. 3;

IN THE CLAIMS:

Please enter the following amended claims:

1. (Amended) A back electrode electronic part comprising:

a main body including a circuit; and

electrodes arranged for solder bumps on a back surface portion of said electronic part and connected to said circuit; wherein

said electrodes are arranged into groups of electrodes at portions of the electrode arrangement;

said groups of electrodes are provided for a single first solder bump which is larger than second solder bumps for said electrodes arranged other than in said groups of electrodes; and

said groups of electrodes includes electrodes having a substantially same potential level when said circuit operates.

2. (Amended) A back electrode electronic part according to claim 1, wherein said electrodes are arranged in a matrix, and said groups of electrodes are corner portions.

3. (Amended) A back electrode electronic part according to claim 1, wherein said group of electrodes includes a non-contact electrode which is not connected to said circuit.

4. (Amended) A back electrode electronic part according to claim 1, wherein one of said electrodes of said group is a signal electrode.

5. (Amended) A back electrode electronic part according to claim 1, wherein one of said electrodes of said group is a ground potential electrode.

6. (Amended) A back electrode electronic part according to claim 1, wherein one of said electrodes of said group is a power supply potential electrode.

7. (Amended) An electronic assembly comprising:

a back electrode electronic part comprising:

a main body including a circuit, and

electrodes provided on a back surface portion of said electronic part and connected to said circuit, wherein said electrodes are arranged into groups of electrodes [said electrodes] at portions of the electrode arrangement;

said groups of electrodes includes said electrodes having a substantially same potential level when said circuit operates;

said electronic assembly further comprising:

a printed circuit board having substrate electrodes corresponding to said electrodes provided for said electronic part, wherein one of said substrate electrodes as a first substrate electrode is provided for each of said groups of electrodes, and said substrate electrodes as second substrate electrodes other than said first substrate electrodes are provided for said electrodes of said electronic part other than in said groups of electrodes; and

solder bumps including first solder bumps connected with said groups of electrodes and said first substrate electrodes and second solder bumps connected with said second substrate electrodes and said electrodes of said electronic part other than said groups of electrodes.

8. (Amended) A back electrode electronic part according to claim 7, wherein said electrodes of said electronic part are arranged in a matrix, and said groups of electrodes are corner portions.

9. (Amended) A back electrode electronic part according to claim 7, wherein one of said integrated electrodes of said group is a non-contact electrode which is not connected to said circuit.

10. (Amended) A back electrode electronic part according to claim 7, wherein one of said integrated electrodes of said group is a signal electrode.

11. (Amended) A back electrode electronic part according to claim 7, wherein one of said electrodes of said group is a ground potential electrode.

12. (Amended) A back electrode electronic part according to claim 7, wherein one of said electrodes of said group is a power supply potential electrode.

REMARKS

Applicant thanks the Examiner for acknowledging the claim for priority in 35 U.S.C. § 119 and receipt of the certified copy of the priority document.

Applicant thanks the Examiner for considering the references cited with the Information Disclosure Statements filed April 11, 2000 and November 22, 1999.

Status of the Application

Claims 1-12 are all the claims pending in the Application. Claims 1-12 have been rejected.

Indefiniteness Rejections of Claims 1-12 Under 35 U.S.C. § 112

The Examiner has rejected claims 1-12 under 35 U.S.C. § 112 as being indefinite because "the scope of the term 'type' cannot be determined because the common qualities that distinguish the individual members as an identifiable class are not recited in the claims." Applicants have amended claims 1-12 to remove "type." Applicants note that these claim Amendments are non-limiting.

The Examiner has rejected claim 7 under 35 U.S.C. § 112 as having two limitations that are "incompatible because the electronic part cannot comprise the circuit board when the circuit board is separate and distinct from the electronic part." Applicant has added non-limiting language to claim 7 to eliminate confusion. Thus, withdrawal of the claim rejections is respectfully requested.

Additionally, the Examiner has rejected claims 1, 3-7, and 9-12 as having elements that lack sufficient antecedent basis. These informalities have been corrected through non-limiting amendments. Thus, withdrawal of the claim rejections is respectfully requested.

Obviousness Rejections of Claims 1-3 and 7-9 Under 35 U.S.C. § 103(a)

The Examiner has rejected claims 1-3 and 7-9 under 35 U.S.C. § 103(a) as being unpatentable over Higashiguchi (US 5,828,128) in view of Geffken (US 6,093,630). This rejection is respectfully traversed.

The Examiner takes the position (Page 5, first full paragraph of the Office Action) that Higashiguchi teaches everything in claims 1-3 and 7-9, except "groups of said electrodes, wherein said group of electrodes includes electrodes having substantially same potential level when said circuit operates. Nonetheless, ... Geffken teaches groups of electrodes 126, 128 having a substantially same potential level when a circuit operates. Morevoer, [sic] it would have been obvious to combine the product of Geffken with the product of Higashiguchi because it would provide electrodes."

In order "to establish *prima facie* obviousness of the claimed invention, all the claim limitations must be taught or suggested by the prior art." In re Royka, 490 F.2d 981 (CCPA 1974).

Higashiguchi

Higashiguchi discloses a "BGA-type semiconductor device" that provides "a soldering bump ... which can be easily checked by visual inspection" (column 2, lines 21-23) in order to verify the soldered state of terminals on inner sides of the device. The Examiner has specifically directed Applicants to column 7, line 48 through column 8, line 21, and column 9, lines 16-48. These sections describe a specific embodiment of such a device as illustrated in FIGS. 9A-9C.

Referring to FIG. 9A, package 20 is placed on wiring board 14. FIGS. 9B and 9C show the result of a solder reflowing process where solder fillet 33 of the large bump 21 is formed

which protrudes outside the footprint 16 and leaves a gap between the fillet 33 and the bump 22 (FIG. 9B). Further, if a solder bridge 34 such as shown in FIG. 9C is not formed, then good connections involving bumps 22 and 21 can be assured. If bridge 34 is found, than other bridges may also occur, and the device would not pass inspection. Additionally, if the small bump 23 is soldered in a good condition as shown in FIG. 9B, it can be determined that all of the soldering bumps are soldered in a good condition since the soldering bumps other than the outermost bumps have a height greater than the small bump 23.

On the other hand, the structure recited in the Application provides multiple electrodes, or "groups of electrodes," that are grouped together on a part to be covered by a single solder bump that is larger than the solder bumps covering the electrodes that are not grouped together, and may then contact a substrate electrode on a circuit board.

There is simply no teaching or suggestion in Higashiguchi of these "groups of electrodes," as recited in claims 1 and 7, or that they "are provided for a single first solder bump which is larger than second solder bumps," as recited in claim 1, or that such a solder bump would be "connected with said groups of electrodes" as recited in claim 7.

On the contrary, Higashiguchi only discloses a one-to-one relationship between bumps 21-23 on package 20, and footprints 16 on wiring board 14, i.e., single electrodes of different sizes soldered to individual footprints. Indeed, Higashiguchi specifically points out that the solder bridge 34 is an undesirable state, which would cause a rejection of the device being checked, and therefore the reference actually teaches away from any "groups of electrodes ... for a single first solder bump."

Geffken

Geffken discloses (column 3, lines 16-34) an integrated semiconductor device 100, a dielectric portion 102, landing wire 104 and personalization wires 106, 108, 110 and 112. Contacts 120, 122, 124, 126, and 128 are provided over the landing wire 104 and personalization wires 106, 108, 110 and 112, respectively. A dielectric layer 130 is provided, with via 140 and personalization via 150. Transition layers 160 and 164 form electrical contacts with bump arrays 170, 172, and 174.

There is no teaching or suggestion in Geffken of "groups of electrodes" that are connected with a "single first solder bump which is larger than second solder bumps," as recited in claim 1, or that such a solder bump would be "connected with said groups of electrodes" as recited in claim 7.

The solder bumps of Geffken do not vary in size dependent upon a connection to "groups of electrodes," as they are all similarly sized. Further, there is no teaching or suggestion that these bumps contact any other device such as the substrate of the invention.

Therefore, because Geffken fails to provide at least the features noted above that are missing from Higashiguchi, the references do not teach or suggest all the claim limitations, and the Examiner has not established *prima facie* obviousness. Thus, Applicant respectfully requests the Examiner to withdraw the rejection of claims 1 and 7 based upon 35 U.S.C. § 103(a).

Additionally, claims 2, 3, 8, and 9 are believed to be allowable at least by virtue of their dependency.

Combination of Higashiguchi and Geffken

Additionally, the Examiner must "show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for a combination in the manner claimed." *In re Rouffet*, 47 USPQ2d 1453 (Fed.Cir. 1998). The mere fact that references c[illegible] combined or modified does not render the resultant combination [or modification] obvious unless the prior art also suggests the desirability of the combination [or modification]." *In re Mills*, 916 F.2d 680 (Fed.Cir. 1990); MPEP §2143.01.

The Examiner has applied a blanket statement that "it would have been obvious to combine the product of Geffken with the product of Higashiguchi because it would provide electrodes." However, both Geffken and Higashiguchi already disclose electrodes. Such a blanket statement cannot show any reason why the elements from the cited prior art references would be combined in the manner claimed. There is simply no teaching or suggestion in either reference that a combination with the other is desirable, or even possible.

Obviousness Rejections of Claims 4-6 and 10-12 Under 35 U.S.C. § 103(a)

The Examiner has rejected claims 4-6 and 10-12 under 35 U.S.C. § 103(a) as being unpatentable over Higashiguchi (US 5,828,128) in view of Geffken (US 6,093,630) and further in view of Sakoda. This rejection is respectfully traversed.

Applicant submits that claims 4-6 and 10-12 are allowable at least by virtue of their dependency.

Conclusion

In view of the foregoing, it is respectfully submitted that claims 1-12 are allowable. Thus, it is respectfully submitted that the application now is in condition for allowance with all of the claims 1-12.

Reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

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